

DESCRIPTION

This interface system has been developed to be the link between a programmable controller and a 16 Microcell-type beam. This system simplifies the wiring of the beams and reduces the number of connections to the controller by using an RS485 intelligent communication. The control of the beams being entirely in the hands of the interface system, the controller is free for other duties.

SPECIAL FEATURES

- ↗ The product is composed of two modules: one controlling the emitters, the other controlling the receivers and the communication. The decentralized connection between the emitters and the receivers simplifies the heads wiring.
- ↗ Easy connection between the product and the controller : 4 wires are enough for the power supply and the communication ;
- ↗ Half Duplex RS485 communication port well adapted to industrial environments ;
- ↗ Transmission speed selection : 9600 or 19.200 bps ;
- ↗ Possibility to choose between ASCII bus mode or quick mode ;
- ↗ Possibility to connect up to 4 interface systems on the same communication bus ;
- ↗ Response time of the beams without frame transfer time : < 20 ms ;
- ↗ Detection of short-circuit on the receivers (only possible on quick mode) ;
- ↗ Control LED on the emitting module ;
- ↗ Status of the beams visualized by red LEDs on the receiving module ;
- ↗ Low current consumption : <100 mA under 12 to 24 Vdc ;
- ↗ 3.5mm pitch Plug connector to make the pre-wiring and the maintenance easier ;
- ↗ Extruded profile aluminum housing, solid and easy to install ;
- ↗ Each beam is fit out with a plug connector to make the pre-wiring easier ;
- ↗ Product complying with the EC norms in force ;
- ↗ Possibility to increase the beam range up to 6 meters on request.

TECHNICAL SPECIFICATIONS

Microcell

Technology : Active infrared + microprocessor

Maximum range : 1.5m

Distance between beams : 20cm minimum

Beam aperture half-angle : 8°

Sunlight immunity :

- 75.000 lux at an angle of 8°
- 20.000 lux in the axis

Temperature range : -20°C à +55°C

Detection head sealing : IP65(DIN40050)

Dimensions cylindrical heads :

- body : 10mm (embedded Length)
12.4mm (diameter)
- collar : 15.6mm

Housing colour : ABS black.

Weight of a single head : 2 g

Heads cable colours :

- emitter : grey / blue (or yellow / black) ;
- receiver : black / blue (or green / black).

Cable colours :

- emitter : grey (or yellow) ;
- receiver : black (or green).

Control boxes

Technology : RISC microprocessor

Supply voltage : 12 - 24 VDC +/-10%

Max. current consumption : <100mA at 24Vdc

Number of strut up Microcells : 16

Way of multiplexing : 4x4 active heads at a time

Response time (without communication) : <20ms

Max length of the heads cable (2 wires):

- 5 m twisted ;
- 10 m shielded.

Max length of cable between modules :

- 2 m ;
- 5 m shielded.

Communication type : RS485 (half duplex)

Baud rate (selection by dip switch):
9600 or 19200bps

Communication mode :

unidirectional or bidirectional

Maximum address number : 4

Global time in bus mode :

- 33ms min @ 19200Bps
- 45ms min @ 9600Bps

LEDS : 16 red LEDS

Dimensions of the emitting module :
150mm x 81mm x 32mm

Weight of the emitting module : 230g

Dimensions of the receiving module :
200mm x 81mm x 32mm

Weight of the receiving module : 300g

FUNCTIONAL DESCRIPTION

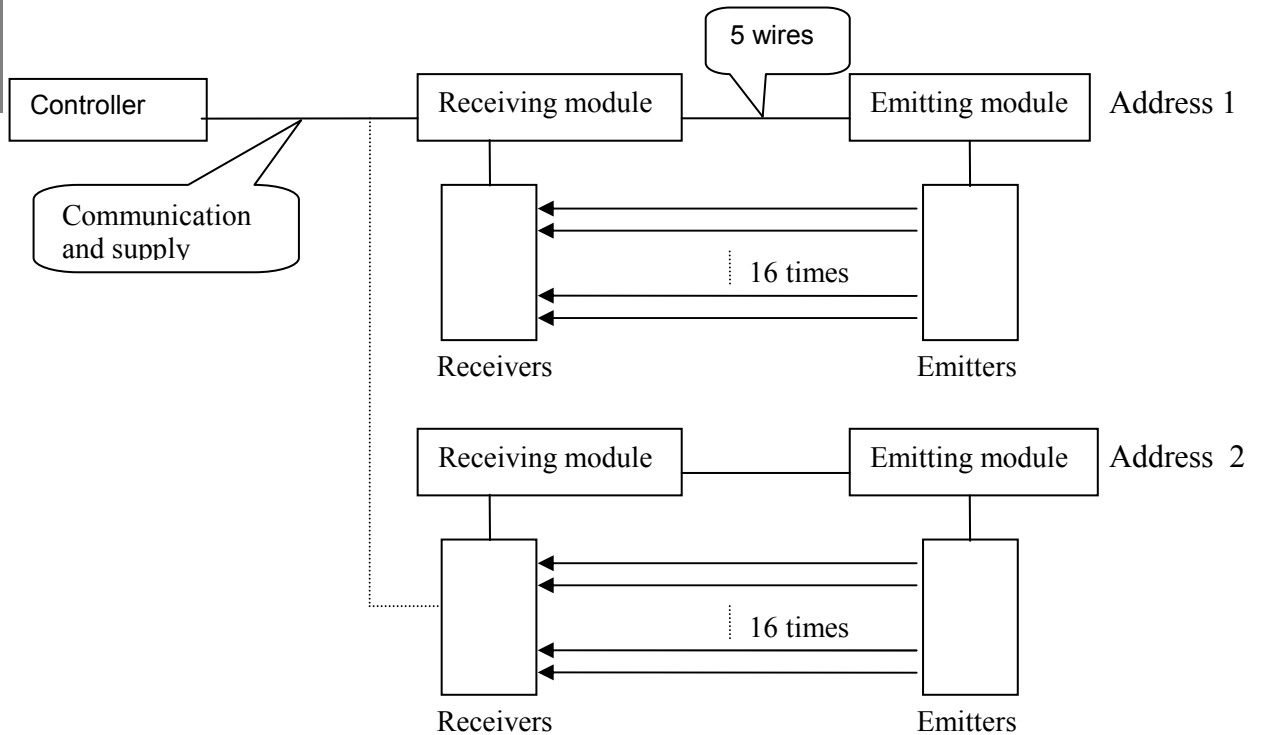
This product has been developed to control 16 Microcell-type IR beams.

This interface is divided into 2 modules : one for the control of the 16 emitters and the other for the control of the 16 receivers.

This system must be used with a programmable controller fit out with a communication terminal. The controller supplies the 24 VDC voltage to the interface system. A 5 wires cable links the two control modules.

FUNCTIONAL DESCRIPTION

Functional wiring structure:



WIRING AND INSTALLATION

On the receiving module 16 red LEDs show the status of each beam. Plug connectors with 3.5 mm pitch are used. The 2 twisted wires enable the connection of each head to the controller. The wires must be between 0.5 m and 5 m long. Thanks to the multiplexing of the heads, there is no interference between two heads.

The status information of the beams are transmitted to the controller via a RS485 communication. It is possible to connect other terminals (maximum 32) on this bus.

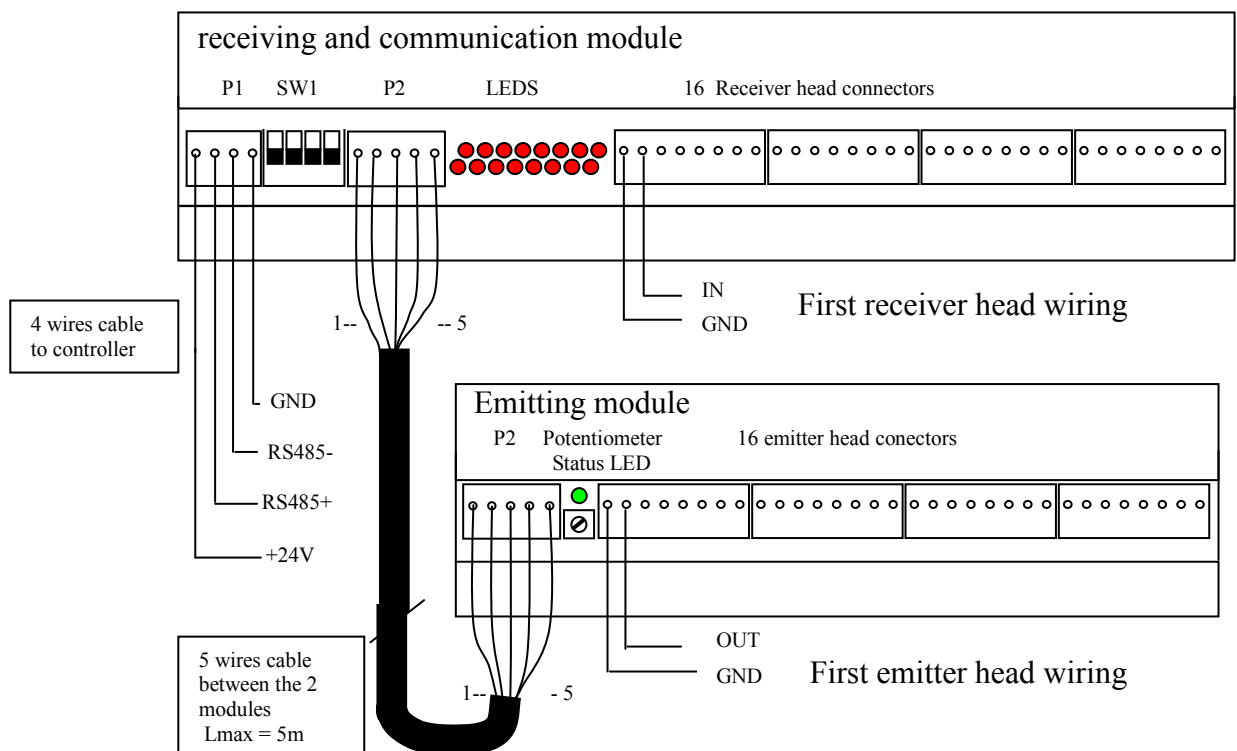
The 2 modules composing the system are housed in aluminum profiles that can be fixed with screws or with double-side adhesive.

A green LED on the emitting module indicates if the module is on. If the link between the 2 modules is not correct, the LED will remain off and the MULTIBEAM will not work properly.

A potentiometer on the emitting module allows to adjust them emission power in order to reduce the influence of one module to an other module in close proximity (turn clockwise = increase emission power).

The receiver has a green cable and the emitter a yellow cable.

Wiring Diagram:



1. Hardware :

The communication module uses the standard RS485, the driver is a low EMI 250 Kbits-type, protected against electrostatic discharges.

Up to 32 terminals may be connected on the same BUS line.

The twin-wire communication enables the Half Duplex operating mode.

A dip-switch enables you to choose the operating mode of the MULTIBEAM. Be aware to always make an "on/off" operation on the MULTIBEAM after each modification to the dip-switches in order to activate this modification.

SW mode	OFF ON	ASCII bus mode quick mode (House)
SW2 (baud rate)	OFF ON	9600bps 19200bps
SW3 et SW4 (address)	OFF,OFF OFF,ON ON,OFF ON,ON	address 0 address 1 address 2 address 3

2. Software :

Dip switches enable you to choose between bus or quick mode.

With the dip-switch you can choose the baud-rate : 9600 or 19200 Bps.

2.1. ASCII BUS mode

The communication and the processing of head signals are asynchronous. The controller leads the communication and sequentially questions the terminals on the BUS.

Each terminal has a different address. This address can be fixed between 0 and 3 thanks to the two dip-switches, which can be found on the MULTIBEAM receiving module. The controller interrogation speed can vary from 33ms to endless time without troubling the process of the module.

In case of communication interruption, the beams keep on working as well as the visualization LEDs. A delay of 1,5 ms before the MULTIBEAM sends its answer has been added in order to avoid any trouble on the RS485 line.

Structure of the byte for the ASCII BUS mode

Start bit, 7 data bits, 1 bit of even parity and 1 stop bit.

Structure of the controller frame to the MULTIBEAM

Header ' :'
Address from 0 to 3 (for example '0' '1')
Function '0' '0'
Checksum 'F' 'F' 2's complement (adress + function)
CRLF carriage return et linefeed 0x0d 0x0a

Total : 9 bytes

Structure of the MULTIBEAM frame to the controller

Header ' :'
Address from 0 to 3 (for example '0' '1')
Function '0' '0'
low detection '0' '0' (first 8 beams)
high detection '0' '0' (last 8 beams)
Checksum 'F' 'F' 2's complement (address + function + low detection + high detection)
CRLF carriage return et linefeed 0x0d 0x0a

Total : 13 bytes

The response will be sent 1.5 ms after receiving the demand.

Calculating the time of a cycle

Beams process time :	20.000ms
Transfer time of the frame to the MB at 9600 bps :	9.75ms
Waiting time between interrogation and answer :	1.50ms
Transfer time of the answer from the MB at 9600 bps :	13.54ms
Total time of a 9600 bps cycle :	44.8 ms

Beams process time :	20.000ms
Transfer time of the frame to the MB at 19200 bps :	4.69ms
Waiting time between interrogation and answer :	1.50ms
Transfer time of the answer from the MB at 19200 bps :	6.77ms
Total time of a 19200 bps cycle :	33 ms

2.2. Quick mode

It is a lightened communication mode adapted to a high speed use of the MULTIBEAM. The configuration of this mode is the same as for the BUS mode, except that the controller interrogation speed can vary from 26 ms to endless time without troubling the process of the module.

Byte structure for the quick mode Hexa:
start bit, 8 data bits and 1 stop bit, no parity.

Structure of the door controller frame to the MULTIBEAM

STX header value 2

Address of the interrogated control box of 00H, 01H, 02H or 03H (depends of the position of the dip-switches)

Checksum (STX + address) AND 127

ETX End of frame value 3

Total : 4 bytes

Structure of the MULTIBEAM frame to the door controller

STX header value 2

Module Address of 00H, 01H, 02H or 03H (depends on the position of the dip-switches)

Byte1 8 bits that match with the first 8 beams (Bit on 1 = detection)

Byte2 8 bits that match with the last 8 beams (Bit on 1 = detection)

Checksum (STX + Address + Byte1 + Byte2) AND 127

ETX End of frame value 3

Total : 6 bytes

The MSB of the checksum is on 1 if one of the receiving heads is shortcut. This function is not available on BUS mode.

The working rhythm of the beams is independent of the communication.

Calculating the time of a cycle:

Beams process time :	20.000ms
Transfer time of the frame to the MB at 9600 bps :	4.17ms
Waiting time between interrogation and answer :	1ms
Transfer time of the answer from the MB at 9600 bps :	6.25ms
Total time of a 9600 bps cycle :	31.42ms

Beams process time :	20.0ms
Transfer time of the frame to the MB at 19200 bps :	2.09ms
Waiting time between interrogation and answer :	1ms
Transfer time of the answer from the MB at 19200 bps :	3.125ms
Total time of a 19200 bps cycle :	26.215 ms